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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,808	07/28/2005	Konrad Kapser	4814/PCT	8904

21553 7590 03/06/2009

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EXAMINER	
SHABMAN, MARK A	

ART UNIT	PAPER NUMBER
2856	

MAIL DATE	DELIVERY MODE
03/06/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,808	KAPSER ET AL.	
	Examiner	Art Unit	
	MARK SHABMAN	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/11/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 17-33 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-32, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flach US Patent 5,905,203 (hereinafter referred to as Flach) in view of Siedel US Patent 6,122,965 (hereinafter referred to as Seidel) in view of Church US Patent 4,920,801 (hereinafter referred to as Church).

Regarding **claim 17**, Flach discloses a micromechanical acceleration sensor comprising a frame, an inertial mass 21 and two torsion spring elements 22 suspending the inertial mass from the frame. The torsion spring elements are aligned with one another along a reference plane when the mass is at rest and allow for the inertial mass to pivot about an axis 29 when under a force. The inertial mass is suspended asymmetrically by the pivot axis as seen in figure 2 due to the offsetting of the torsion springs from the center of the mass, thus causing a shift in the center of gravity of the

mass to point 30. The apparatus of Flach does not explicitly disclose plural inertial masses or the center of gravity as being shifted by two offset distances a and b generating an offset angle of more than 20 degrees as claimed.

Seidel discloses an accelerometer with plural inertial masses 2a-d. The apparatus of Seidel based on the design allows for detection of accelerations in multiple directions with an offset angle of 20 degrees. It can be seen in figure 2 of Seidel that the center of gravity of each mass is offset by two distances, in the x and z directions. It would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Seidel with those of Flach to create an accelerometer capable of detecting accelerations in multiple directions using the capacitive sensing components and torsional springs of Flach and the increased sensitivity of Seidel. The combination however does not explicitly teach an offset angle of more than 20 degrees as claimed. The offset angle is based on the distance of the center of mass from the pivot point as can be seen in figure 2 of Seidel. In order to create a larger offset angle, the ratio of the distances in the x and z axes must be changed.

Church discloses, as seen in figure 1, an accelerometer for measurement of acceleration in multiple directions through the use of plural inertial masses 2, 2', and 2". Figure 2(b) shows the suspension of the inertial masses in the sensor and column 3 describes the benefits of an "offset angle" of 55 degrees. In the embodiment of church the larger (or thicker) inertial mass allows for a much larger offset angle of up to 55 degrees to be generated. It would have been obvious to one of ordinary skill in the art at the time of invention to have modified the apparatus of Flach in view of Seidel to

include similarly shaped inertial masses as those of Church to generate a larger offset angle than 20 degrees, thereby allowing for maximum response to the acceleration due to the changed center of gravity of the inertial masses. Column 3 discloses the ratio that the distances a and b must be to one another to obtain such an angle as $\sqrt{2}$ to 1.

Regarding **claim 18**, the configuration of the inertial masses of Seidel are arranged such that there are "at least three" as claimed configured identically with one another and arranged in a rectangular pattern.

Regarding **claim 19**, figure 8 of Flach shows a "first cover plate" 10 arranged on one side of the sensor and spaced by a first gap from said inertial masses as claimed.

Regarding **claim 20**, figure 8 of Flach shows a "second cover plate" 20 which is arranged on a second side of the frame opposite the first side and spaced by a second gap from the inertial masses.

Regarding **claim 21**, Flach illustrates in figure 8 "at least one conductive area respectively arranged on said first cover plate" as claimed in electrodes 12' and 12". The electrodes are located "across" the gap and facing the inertial mass as claimed to form a variable capacitance between the 'conductive area" and the respective inertial mass. The capacitance depends on the distance or "spacing" between the conductive area and the inertial mass.

Regarding **claim 22**, the measurement of the deflection of the inertial mass 21 of Flach is "enabled by a differential capacitive measurement arrangement" as claimed in that the measured capacitance depending on the deflection of the mass determines the acceleration of the system.

Regarding **claim 23**, the embodiment seen in figure 8 of Flach shows the frame in between an upper and lower "cover disk" as claimed which would help to protect the system from environmental influences as claimed.

Regarding **claim 24**, Flach discloses electrodes 12 which read on the "metallized surfaces" as claimed. These surfaces seen on the bottom of figure 8 could easily be on the top if the drawing were to be inverted. Thus the "upper cover disk" can be interpreted as numeral 10 and the electrodes are seen as "close to the respective torsional pivot axis" 29 which enables a differential capacitive measurement of a deflection of each mass as claimed.

Regarding **claim 25**, the surfaces 12' and 12" are not specifically discloses as being arranged symmetrically on either side of the pivot axis created by the torsion spring element 29 however it would have been obvious to have done so in order to ensure a constant variable capacitance is generated by sensor.

Regarding **claim 26**, figure 9 of Flach shows an evaluation circuit which reads on the "deflection measurement device" as claimed which comprises a "capacitive arrangement" to sense a deflection of each mass.

Regarding **claim 27**, the arrangement of the masses in Seidel is for detection of acceleration in three orthogonal axes as claimed. By arranging the masses of Flach in a similar manner, the result would be the same as claimed.

Regarding **claim 28**, by arranging the masses of Flach in the manner taught by Seidel, the torsional pivot axes of the masses would be oriented offset from one another

by multiples of 90 degrees as claimed in order to detect acceleration in all three directions.

Regarding **claim 29**, the masses of Seidel are all arranged in one common reference plane when the sensor is at rest and the masses are not being deflected.

Regarding **claim 30**, the inertial masses of Flach are arranged in the same manner as the claimed invention and thus the sensitivity axis is perpendicular to the reference plane as claimed.

Regarding **claim 31**, there is no description as to how the "offset angle" is desired in the specification, or why the "offset angle" of 45 degrees is beneficial. Therefore, using the ratio of a to b as claimed appears as a matter of design choice and one of ordinary skill in the art at the time of invention would be able to modify the mass of Flach to place the center of mass in a similar location achieving a similar offset angle as desired.

Regarding **claim 32**, the arrangement of the inertial masses of Seidel comprises an outer frame 5 and intermediate frame 6 as claimed with the inertial masses separated in between both frames. By substituting the inertial mass of Flach with those of Seidel in a similar framing, the result is an arrangement in which the "outer" spring element connects the inertial mass to the outer frame and the "inner" spring element connects to the inner divider frame as claimed.

Regarding **claim 34**, the offset angle of Church as it applies to the other references would be at least 21 degrees as claimed.

Regarding **claim 35**, the apparatuses of both Flach and Seidel consist of Silicon as claimed.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flach in view of Seidel.

Regarding **claim 33**, Flach discloses an acceleration sensor comprising an inertial mass surrounded by a frame, which is suspended by a set of two torsion spring elements 22 from a frame as seen in figure 2 creating a torsional pivot axis about which the inertial mass is pivotable. The arrangement allows for the sensor to operate based on the principle of detecting a difference in capacitances of sensors 12' and 12" for determining a sensed acceleration. The apparatus in Flach as shown is only used for detection of acceleration in a single direction however.

Seidel discloses an accelerometer comprising plural inertial masses 2a-2d. The plurality of inertial masses are configured for detection of acceleration in multiple directions as opposed to that of Flach. The proof masses of Seidel comprise centers of gravity which are offset from the pivot axis in two orthogonal directions as claimed. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Flach to comprise plural inertial masses such as seen in Seidel, to allow for accelerations to be detected in two or three different dimensions with a single device with each of the proof masses having an increased error angle as described in column 3, thereby increasing the sensitivity to acceleration. By maintaining the torsion springs of Flach, the capacitive sensing means would be retained. Further,

Seidel discloses an outer frame 5 and intermediate frame 6 as claimed with the inertial masses separated in between both frames. In substituting the inertial mass of Flach with those of Seidel in a similar framing, the result is an arrangement in which the "outer" spring element connects the inertial mass to the outer frame and the "inner" spring element connects to the inner divider frame as claimed.

Claims 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flach in view of Seidel as applied to claim 33 above, and further in view of Church.

Regarding **claims 36 and 37**, an offset angle is established in the Seidel reference for increasing the detection of acceleration, based on the offsetting of the center of gravity from the pivot axis. By drawing a line between the pivot axis and the center of gravity, a "reference line" can be formed with a "reference plane" parallel to a major surface of the inertial mass through the pivot axis. The offset angle of Seidel is not explicitly disclosed as being greater than 20 degrees as claimed.

The Church reference teaches how modifying the shape of the inertial mass can alter the offset angle and the benefits of a higher value for the angle. It would have been obvious to one of ordinary skill in the art at the time of invention to have changed the mass according to Church in order to achieve an offset angle of greater than 21 degrees to create more sensitivity in the system.

Regarding **claim 38**, as the Church reference teaches the design and method for creating a mass with any offset angle, one of ordinary skill in the art at the time of

invention would have been able to create an offset angle of 45 degrees by modifying the design of the mass accordingly.

Regarding **claim 39**, the apparatuses of the Flach and Seidel references comprise inertial masses, frames and torsional springs consisting of silicon as claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK SHABMAN whose telephone number is (571)270-3263. The examiner can normally be reached on M-F 8:00am - 4:30pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. S./
Examiner, Art Unit 2856

/Daniel S. Larkin/
Primary Examiner, Art Unit 2856